

REMARKS

After entry of this amendment, claims 2-10, 12-20, 22-27, 29-35, and 40-44 remain pending. In the present Office Action, claims 1, 8, 11, 21, 28, and 36-43 were rejected under 35 U.S.C. § 102(b) as being anticipated by Senator et al., U.S. Patent No. 5,761,677 ("Senator"). Claims 2-10, 12, 18-20, 22-27, 20, and 35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Senator in view of Zheng et al., U.S. Patent No. 6,571,259 ("Zheng"). Claims 13-17 and 30-34 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Senator in view of Zheng and Raz, U.S. Patent No. 5,701,480 ("Raz"). Applicant respectfully traverses these rejections and requests reconsideration.

Claims 2-7, 12-20, 22-27, and 29-35

Applicant respectfully submits that each of claims 2-7, 12-20, 22-27, and 29-35 recites a combination of features not taught or suggested in the cited art. For example, claim 2 recites a combination of features including: "a non-volatile memory storing a first inode locating a first file in said storage and also storing a journal comprising a list of committed inodes; and a block manager ... configured to atomically update said first file in response to a commit of said first file by writing said second inode to said non-volatile memory ... and wherein said block manager is configured to record said second inode in said journal".

The present Office Action alleges that the above features are obvious over Senator in view of Zheng. Applicant respectfully disagrees. To form a *prima facie* case of obviousness for a claim, a combination of references must teach or suggest each and every feature of the claim. The alleged combination of Senator and Zheng does not teach or suggest the combination of features recited in claim 2.

The Office Action relies on Zheng to teach a journal. While Zheng does teach a file system index 37, that index is "in-memory". Particularly, the file system index is in random access memory (see Zheng, col. 6, lines 3-9). Similarly, the Office Action refers to Zheng's LRU list 36, which is also in-memory, and particularly random access

memory. Storing the file system index 37 and the LRU list 36 in a random access memory (well-known to be a volatile memory) does not teach "a non-volatile memory storing a first inode locating a first file in said storage and also storing a journal comprising a list of committed inodes".

Furthermore, it would not be obvious to modify Zheng's teachings to storing his file system index 37 or LRU list 36 in a non-volatile memory, as it would change the intended purpose of Zheng: "All disk-block reservation and pre-allocation mapping are in the memory, and after a crash, they are automatically discarded" (See Zheng, abstract, for example). Thus, Zheng intends for all in-memory information (including the file system index 37 and the LRU list 36) to be automatically discarded in a crash, which means that only a volatile memory can be used according to Zheng's teachings.

Still further, **Senator teaches away** from making the combination. While Senator does disclose, in the background, the existence of journals of changes to file system records (e.g. Senator, col. 1, lines 28-35), Senator teaches away from using such journals/data logs in his invention. For example, Senator teaches "The VERSION module 107 provides for various versions of a file without the need for data copy or log operations". (Senator, col. 3, lines 39-40). In fact, avoiding the use of such journals/data logging is a central feature of Senator's invention: "Various versions of a computer file are provided without requiring copying the file or logging changed data, so that the files have consistent user data" (Senator, abstract, lines 1-3); and "In accordance with the instant invention, the above problems of inconsistency and throughput bottlenecks have been solved by providing for various versions of a file without the need for data copy or log operations" (Senator, col. 1, lines 63-65). See also Senator, col. 2, lines 13-15; col 5 lines 43-47.

In fact, Senator handles the consistency of file data and multiple versions of files in a completely different way, storing pointers to current and previous inodes in the inodes themselves (see, e.g., Senator, Figs 3c-3e, elements 305 and 307 and col. 5, lines 12-25).

For at least the above stated reasons, Applicant submits that the rejection of claim 2 over the alleged combination of Senator and Zheng is not supported, and should be withdrawn. Claims 3-7 depend from claim 2, and thus the rejection of these claims should be withdrawn for at least the above stated reasons as well. Each of claims 3-7 recite additional combinations of features not taught or suggested in the cited art.

Claim 12 recites a combination of features including: "atomically updating said first file by establishing said second inode as the inode for said first file, wherein said establishing comprises storing said second inode in a journal stored in a nonvolatile memory". The same teachings of Senator and Zheng highlighted above with respect to claim 2 are relied on to reject claim 12. Therefore, the rejection of claim 12 over the alleged combination of Senator and Zheng is also not supported, and should be withdrawn. Claims 13-20 depend from claim 12, and thus the rejection of these claims should be withdrawn for at least the above stated reasons as well. Each of claims 13-20 recite additional combinations of features not taught or suggested in the cited art.

Claim 22 recites a combination of features including: "a non-volatile memory storing a first inode locating a first version of a file in said storage and also storing a journal comprising a list of committed inodes; and a block manager ... configured to atomically update the file, producing a second version of the file, in response to a commit of the file by writing said second inode to said non-volatile memory... and wherein said block manager is configured to record said second inode in said journal". The same teachings of Senator and Zheng highlighted above with respect to claim 2 are relied on to reject claim 22. Therefore, the rejection of claim 22 over the alleged combination of Senator and Zheng is also not supported, and should be withdrawn. Claims 23-27 depend from claim 22, and thus the rejection of these claims should be withdrawn for at least the above stated reasons as well. Each of claims 23-27 recite additional combinations of features not taught or suggested in the cited art.

Claim 29 recites a combination of features including: "atomically updating the

file to the second version by establishing said second inode as the inode for the file, wherein said establishing comprises storing said second inode in a journal stored in a nonvolatile memory". The same teachings of Senator and Zheng highlighted above with respect to claim 2 are relied on to reject claim 29. Therefore, the rejection of claim 29 over the alleged combination of Senator and Zheng is also not supported, and should be withdrawn. Claims 30-35 depend from claim 29, and thus the rejection of these claims should be withdrawn for at least the above stated reasons as well. Each of claims 30-34 recite additional combinations of features not taught or suggested in the cited art.

Claims 8-10

Applicant respectfully submits that each of claims 8-10 recites a combination of features not taught or suggested in the cited art. For example, claim 8 recites a combination of features including: "a storage coupled to receive said one or more write commands ... wherein said storage is configured to copy one or more blocks of said file to a copied one or more blocks, said one or more blocks updated by said one or more write commands, and wherein said storage is configured to update said copied one or more blocks with write data corresponding to said one or more write commands".

The Office Action alleges that Senator anticipates claim 8. Applicant respectfully disagrees. Senator repeatedly teaches that no file data is copied in his system: "The VERSION module 107 provides for various versions of a file without the need for data copy or log operations". (Senator, col. 3, lines 39-40). In fact, avoiding the use of such copying is a central feature of Senator's invention: "Various versions of a computer file are provided without requiring copying the file or logging changed data, so that the files have consistent user data" (Senator, abstract, lines 1-3); and "In accordance with the instant invention, the above problems of inconsistency and throughput bottlenecks have been solved by providing for various versions of a file without the need for data copy or log operations" (Senator, col. 1, lines 63-65). See also Senator, col. 2, lines 13-15; col 5 lines 43-47.

Senator teaches: "a module responsive to a system call argument to allocate

another node in the file system tables and to copy the data block allocations from the old node into the newly allocated node. Both nodes now contain the same data block allocation information. Shadow pointers are set in the old node to point to the new node and set in the new node to point to the old node. Changes to the actual data are now made with respect to the new node and fresh data blocks are allocated for the changed blocks." (Senator, col. 2, lines 15-23). Senator includes no teaching of copying data from a previous data block to the newly allocated data block when an update is made.

For at least the above stated reasons, Applicant submits that the rejection of claim 8 is not supported by Senator and the rejection should be withdrawn. Claims 9-10 depend from claim 8, and thus the rejection of these claims should be withdrawn for at least the above stated reasons as well. Each of claims 9-10 recite additional combinations of features not taught or suggested in the cited art.

Claims 40-44

Applicant respectfully submits that each of claims 40-44 recites a combination of features not taught or suggested in the cited art. For example, claim 40 recites a combination of features including:

a computing node configured to generate a plurality of write commands to update a first file and a commit command defined to commit the updates to the first file;

an interconnect to which the computing node is coupled, wherein the computing node is configured to transmit the plurality of write commands and the commit command on the interconnect; and

a storage coupled to the interconnect and configured to store the first file, wherein the storage is configured to atomically update the first file to reflect the plurality of write commands responsive to the commit command.

Senator teaches a set of software modules (e.g. the reap module, rollback module, and version module) which execute on a host system. These modules communicate with the storage devices via the I/O system (for UFS) or the network I/O system (for NFS). That

is, the modules are on the same side of the I/O systems as the user applications and other software that cause writes to files. Senator teaches: "The VERSION module 107 provides for various versions of a file without the need for data copy or log operations. Module 107 receives an input signal from either the COMMIT system call or the FSYNC call. The ROLLBACK module 109 restores a previous version of a file by associating the file name with the metadata for the previous version. The REAP module removes previous versions of a file that are determined to be no longer needed and impractical to retain indefinitely." Accordingly, these modules handle the creation and deletion of file versions. None of this teaches or suggests: "a computing node configured to generate a plurality of write commands ... an interconnect to which the computing node is coupled ... and a storage coupled to the interconnect and configured to store the first file, wherein the storage is configured to atomically update the first file to reflect the plurality of write commands responsive to the commit command."

For at least the above stated reasons, Applicant submits that the rejection of claim 40 is not supported by Senator and the rejection should be withdrawn. Claims 41-44 depend from claim 40, and thus the rejection of these claims should be withdrawn for at least the above stated reasons as well. Each of claims 41-44 recite additional combinations of features not taught or suggested in the cited art.

CONCLUSION

Applicant submits that the application is in condition for allowance, and an early notice to that effect is requested.

If any extensions of time (under 37 C.F.R. § 1.136) are necessary to prevent the above referenced application(s) from becoming abandoned, Applicant(s) hereby petition for such extensions. If any fees are due, the Commissioner is authorized to charge said fees to Meyertons, Hood, Kivlin, Kowert, & Goetzel, P.C. Deposit Account No. 501505/5181-59100/LJM.

Also enclosed herewith are the following items:

- ☒ Return Receipt Postcard
- ☐ Petition for Extension of Time
- ☐ Request for Approval of Drawing Changes
- ☐ Notice of Change of Address
- ☐ Please debit the above deposit account in the amount of \$ for fees ().
- ☐ Other:

Respectfully submitted,



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